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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/202,267	12/09/1998	TAKAO NISHIKAWA	P3297B	2673

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EXAMINER	
TUGBANG, ANTHONY D	
ART UNIT	**PAPER NUMBER**
3729	28

DATE MAILED: 11/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/202,267	Applicant(s) NISHIKAWA ET AL.	
	Examiner A. Dexter Tugbang	Art Unit 3729	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 September 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6-10,14,18-20,22-26,30,34 and 35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-10,14,18-20,22-26,30,34 and 35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Continued Examination under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/2/03 has been entered.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 102

2. Claims 1-3, 6, 18-20 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Japanese Patent Publication JP 4-338550, referred to hereinafter as JP'550.

JP'550 discloses the claimed manufacturing method comprising: manufacturing a green sheet (substrate 20) made of silicon and having a prescribed relief pattern (shown in Fig. 2d) in response to a head base (plate 11); forming the head base 11 by coating and solidifying a material of Ni through electro-deposition; stripping off the head base from the green sheet (shown in Fig. 2g); and subsequently forming a nozzle port (curved shaped openings on the top surface of plate 11) for discharging in on the head base. The head base comprises a plate 11, which as nozzle ports (curved shaped openings on the top surface of plate 11) and concave portions (rectangular shaped openings on the bottom surface of plate 11 shown in Fig. 2g) in which the green sheet 20 has a relief pattern (film 23) in response to the concave portion. The

nozzle ports are not said to be formed or completed formed until after the head base 11 is completely stripped or removed.

Regarding Claim 2, JP'550 also teaches forming a resist layer 22 in response to a prescribed pattern on a substrate 21 of the green sheet 20 and forming the relief pattern on the substrate by etching (see sequence of Figs. 2a-2c).

3. Claims 1, 6-8, 10, 14, 18, 22-24, 26, 30, 34 and 35 rejected under 35 U.S.C. 102(b) as being anticipated by Japanese Patent Publication JP 6-23993, referred to hereinafter as JP'993.

JP'993 discloses a method of manufacturing an ink jet head comprising: manufacturing a green sheet 21 (in Fig. 8) in response to a head base 24 (in Fig. 8); the head base comprising a plate in which a nozzle port 26 (in Fig. 14) is formed and a concave portion 27 with a relief pattern defining ink pressure chambers (see final structuring in Fig. 14); coating and solidifying a material for forming the head base on a surface of the green sheet having the relief pattern (see sequence of Figs. 8 and 9); stripping or removing the head base from the green sheet (see sequence of Figs. 11 and 12); and subsequently forming the nozzle ports 26 by washing (see Constitution).

Regarding Claims 6-8 and 22-24, JP'993 shows hardening the head base by imparting energy of irradiating light (see arrows in Fig. 11) where the head base 24 is formed from a thermoplastic substance of a photosetting resin (see Constitution).

Regarding Claims 10 and 26, JP'993 shows that the green sheet 21 has the relief pattern with multiple recesses, each being tapered, between the dome-shaped projections on the surface of element 23 (see Fig. 8).

Regarding Claims 14, 30, 34 and 35, JP'993 shows that the nozzle ports 26 are formed by a lithographic method of irradiated light through the use of a resist 22 with the claimed "interface" being read as the top surface of element 23 (in Fig. 11). The "interface" is between the green sheet 21 and the head base 24.

Claim Rejections - 35 USC § 103

4. Claims 4, 7 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP'550 in view of Trueba.

JP'550 teaches the claimed manufacturing method as previously discussed. JP'550 does not teach that the green sheet is made of quartz glass and that the imparted energy is heat.

Trueba teaches manufacturing techniques that include a peelable green sheet 201 made of glass that is for coating and hardening a material that is electroformed onto the green sheet (see col. 4, lines 10-16 and lines 48-60). Trueba utilizes the combination of both coating, i.e. electroforming, and heating by baking to harden the coated material (see sequence of Figs. 2A-2L). One such advantage of utilizing Trueba's manufacturing techniques allows control of the final shape of the workpiece with improved manufacturing tolerances (see col. 3, lines 15-29).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of JP'550 by utilizing the manufacturing techniques of Trueba, to positively allow control of the final shape of the head base with improved manufacturing tolerances.

Regarding Claim 4, it would have been an obvious matter of engineering design choice to choose any desired substrate material of the green sheet, since applicants have not disclosed that

the claimed green sheet substrate material of a *quartz glass* solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the glass substrate material taught by Trueba. The green sheets of both JP'550 and Trueba have the same function of being peelable sheets with the application of a coated and hardened material being formed on the green sheet.

5. Claims 8, 9, 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP'550 in view of Moynihan 5,640,184.

JP'550 teaches the claimed manufacturing method as previously discussed. The modified JP'550 method does not teach that the head base is made of a thermoplastic substance, more specifically a hydrated glass.

Moynihan suggests that a head base can be made from thermoplastic materials of alumina or *glass* to provide the head base material with a thermal expansion coefficient compatible with adjacent components to be used in operation of an ink jet print head (see col. 14, lines 10-18).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the head base of JP'550 by forming the head base with thermoplastic materials of glass, as taught by Moynihan, to positively provide a head base with a thermal expansion coefficient compatible with adjacent components to be used in the operation of the ink jet print head.

It is noted that the Applicants recite specific material limitations in Claims 9 and 25, i.e. that the glass is "hydrated". However, such limitations must result in a manipulative difference in the recited process steps as compared to the prior art. In this instance these material limitations are held to be obvious and not given patentable weight in these method of

manufacturing claims as such limitation(s) do not result in any difference in the *claimed* manufacturing process.

6. Claims 10 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP'550 in view of Sachdev et al 5,470,693.

JP'550 teaches the claimed manufacturing method as previously discussed. The modified JP'550 method does not teach that the relief pattern has a recess with a tapered shape. The recess of JP'550 appears to have straight vertical walls.

Sachdev teaches a lithographic process in which a resist relief pattern 7 (in Fig. 1C) is formed with a tapered shape. Such an advantage of the tapered profile allows the member being etched under the resist relief pattern to retain a good image profile structure having a high resolution (see col. 8, lines 46-54).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the resist relief pattern of JP'550 by forming a tapered shape, as taught by Sachdev, to advantageously form the layers being etched under the resist relief pattern to retain a good image profile structure having a high resolution.

Response to Arguments

7. Applicants' arguments filed 9/2/03 (Paper No. 25) have been fully considered but have not been deemed to be found as persuasive.

In regards to the merits of JP'550, the applicants contend that JP'550 does not teach forming the nozzle ports after the head base is stripped from the green sheet.

The examiner most respectfully disagrees. While the process of forming the nozzle ports (curved shaped openings on the top surface of plate 11) of JP'550 may start or begin initially before the head base is stripped from the green sheet, the nozzle ports are not *formed,* i.e. *completely formed*, until the head base is stripped from the green sheet. The reason for this is that neither the nozzle ports nor the head base cannot possibly be used in any ink jet operation until the head base is stripped from the green sheet. In other words, the green sheet is not part of the finished product of the head base or more importantly, not part of the finished product of the nozzle ports. Thus, the complete formation of the nozzle ports is not accomplished until after the head base is stripped from the green sheet. Accordingly, JP'550 still satisfies the limitations of "after stripping...head base" (last 3 lines of each of Claims 1 and 18).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dexter Tugbang whose telephone number is 703-308-7599. The examiner can normally be reached on Monday - Friday 9:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 703-308-1789. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3590 for regular communications and 703-305-3588 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0858.

A. Dexter Tugbang
Primary Examiner
Art Unit 3729

November 2, 2003